Design Considerations from a Construction Point of View

Amy C. Tootle, P.E.

State Construction Engineer

Richard Hewitt, P.E.

State Construction Pavement Engineer

Agenda

- Conflicting Plan Notes
- Plan Errors and Omissions
- Bid Q & A
- Back Up Documentation
- Constructability Issues

Conflicting Plan Notes

- Geotechnical
 - PDA versus EDC
 - Drilled Shaft Installation

Conflicting Plan Notes: Example 1

The plan note calls for the use of PDA:

PILE INSTALLATION NOTES:

- 1. All piles shall be square pre-stressed concrete piles.
- 2. Minimum tip elevation is required for lateral stability.
- 3. All test pile shall be tested using <u>Pile Driving Analyzer (PDA)</u> and shall be driven to at least the nominal bearing resistance in accordance with Section 455 of the FDOT Standard Specifications.

Conflicting Plan Notes: Example 1

The Specification allows for the use of EDC or PDA:

455-5.14 Dynamic Load Tests: The Engineer will take dynamic measurements during the driving of piles period in the Plans or authorized by the Engineer. For concrete piles, install instruments prior to driving and assist the Engineer in monitoring all blows delivered to the pile. For steel production piles, the Engineer may accept instrumented set-checks or redrives. The Engineer will perform dynamic load tests to evaluate any or all of the following:

- Suitability of the Contractor's driving equipment, including hammer, capblock, pile cushion, and any proposed follower.
 - 2. Pile capacity.
 - 3. Pile stresses.
 - Energy transfer to pile.
 - 5. Distribution of soil resistance.
 - Soil variables including quake and damping.
 - 7. Hammer-pile-soil system for Wave Equation analyses.
 - 8. Pile installation problems.

Other.

EDC

PDA Either install internal gauges in the piles in accordance with Standard Plans, Index 455-003 or attach instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic load testing.

Conflicting Plan Notes: Example 2

The plan note discusses costs for difficult drilled shaft installation:

26. ALL COSTS FOR LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS NECESSARY TO MITIGATE DIFFICULT DRILLED SHAFT INSTALLATION SHALL BE INCLUDED N THE UNIT BID PRICE FOR THE ASSOCIATED SIGN STRUCTURE.

455-15.10 Excavation and Drilling Equipment:

455-15.10.1 General: All shaft excavation is unclassified shaft excavation. The Engineer will require drilled shaft sidewall overreaming when inspections show it to be necessary. These terms are defined in 455-15.10.2, 455-15.10.3, and 455-15.10.4, respectively.

Use excavation and drilling equipment having adequate capacity, including power, torque, and crowd (downthrust), and excavation and overreaming tools of adequate design, size, and strength to perform the work shown in the Plans or described herein. When the material encountered cannot be drilled using conventional earth augers and/or underreaming tools, provide special drilling equipment, including but not limited to rock augers, S

455-24.3 Unclassified Shaft Excavation: Price and payment will be full compensation for the shaft excavation (except for the additional costs included under the associated pay items for casing); removal from the site and disposal of excavated materials; restoring the site as required; cleaning and inspecting shaft excavations; using slurry as necessary; using drilling equipment; blasting procedures, special tools and special drilling equipment to excavate the shaft shown to the depth indicated in the Plans; and furnishing all other labor, materials, and equipment necessary to complete the work in an acceptable manner.

455-24.1 Drilled Shafts: Price and payment will be full compensation for all drilled shafts, including the cost of concrete, reinforcing steel and cross-hole sonic logging tubes, including all labor, materials, equipment, and incidentals necessary to complete the drilled shaft. The cost of the reinforcing steel, including lap lengths, to accommodate shaft lengths longer than shown in the Plans is included in the cost of drilled shafts. Costs associated with repairing defects found in the drilled shaft shall be included in the cost of the drilled shaft.

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Conflicting Plan Notes: Example 2 Specification 700 – Highway Signing

700-2.2 Overhead Signs:

700-2.3 Method of Measurement: For single post and multi post sign assemblies, an assembly consists of all the signs mounted on a single structure. The Contract unit price per assembly for ground mounted signs (single post and multi-post), furnished and installed, will include furnishing the sign panels, support structure, foundation, hardware, and labor necessary for a complete and accepted installation.

The retroreflective sign strip will be paid for separately, and the Contract unit price per each will include furnishing the retroreflective sign strip, hardware and labor necessary for a complete and accepted installation.

For overhead signs, sign panels will be paid separately from support structures. The Contract unit price per each for sign panel, furnished and installed, will include furnishing the sign panels, hardware, and labor necessary for a complete and accepted installation. The Contract unit price for each overhead static sign structure, furnished and installed, will include furnishing the support structure, foundation, hardware, and labor necessary for a complete and accepted installation.

concrete bases and for the nuts and washers.

For all other metal parts of the cast base, the Engineer will allow galvanized steel as an alternative to aluminum.

700-2.2.2 Foundations: Meet the requirements of Section 455.

Conflicting Plan Notes

Design Considerations, Verify The Note:

- Doesn't conflict with an existing specification
- Ties to a pay item for the contractor to bid on
- Is a project specific exception
- Doesn't repeat the Specification

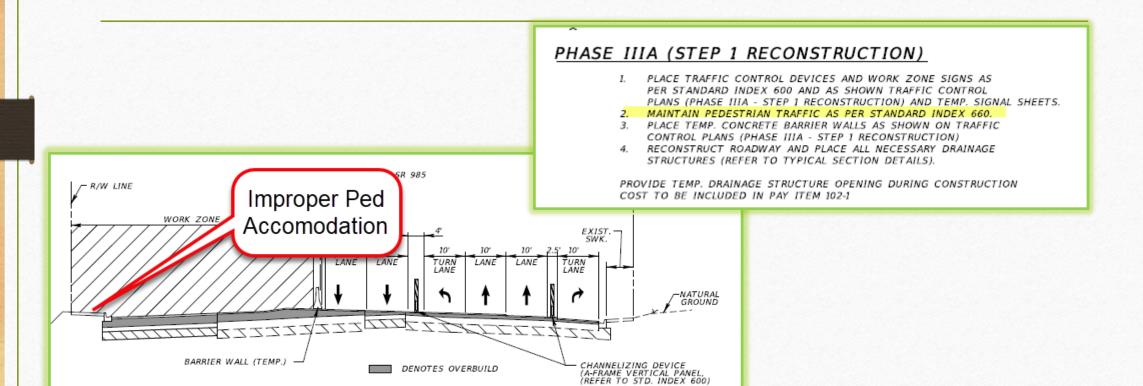
Plan Errors and Omissions

MOT

- Inadequate Pedestrian Detours and Sidewalk Closures
- Conflicting Pavement Markings
- Improper Use of Barriers
- Incorrect Barrier Transitions
- Drainage and Erosion & Sediment Control
 - Incorrect Placement of Erosion and Sediment Control Devices
 - Missing Pay Items and Quantities

- Plans did not properly delineate hazards with Ped LCDs.
- Does not meet FDOT
 Design Manual, Chapter 240,
 Standard Plans, Index 102 660 and ADA Guidelines





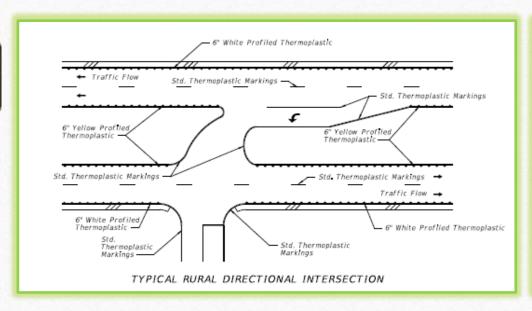
- Type II barricades with Sidewalk
 Closed signs attached were used to close pedestrian walkways and sidewalks
- No pay item was provided in the Plans for Pedestrian LCDs



- Conflicting pavement markings. Plans called for yellow turn lane striping instead of white
- Does not meet MUTCD
 3A.05



Plan Errors and Omissions – Example 3 Standard Plans, Index 711-001 & MUTCD 3A.05



Section 3A.05 Colors

Standard:

- 01 Markings shall be yellow, white, red, blue, or purple. The colors for markings shall conform to the standard highway colors. Black in conjunction with one of the colors mentioned in the first sentence of this paragraph shall be a usable color.
- 02 When used, white markings for longitudinal lines shall delineate:
- A. The separation of traffic flows in the same direction, or
- B. The right-hand edge of the roadway.
- 03 When used, yellow markings for longitudinal lines shall delineate:
 - A. The separation of traffic traveling in opposite directions,
 - B. The left-hand edge of the roadways of divided highways and one-way streets or ramps, or
 - C. The separation of two-way left-turn lanes and reversible lanes from other lanes.
- 04 When used, red raised pavement markers or delineators shall delineate:
- A. Truck escape ramps, or
- B. One-way roadways, ramps, or travel lanes that shall not be entered or used in the direction from which the markers are visible.
- 05 When used, blue markings shall supplement white markings for parking spaces for persons with disabilities.
- 06 When used, purple markings shall supplement lane line or edge line markings for toll plaza approach lanes that are restricted to use only by vehicles with registered electronic toll collection accounts.

- Improper transitions for temporary low profile barrier to existing guardrail and bridge barrier wall.
- Does not meet Standard Plans, Index 102-120



Plan Errors and Omissions – Example 4 Standard Plans, Index 102-120

• The designer should have chosen a more appropriate type of barrier system based on the project conditions.

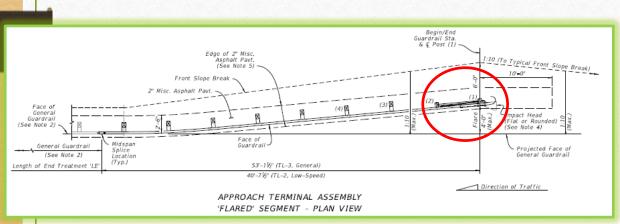
GENERAL NOTES

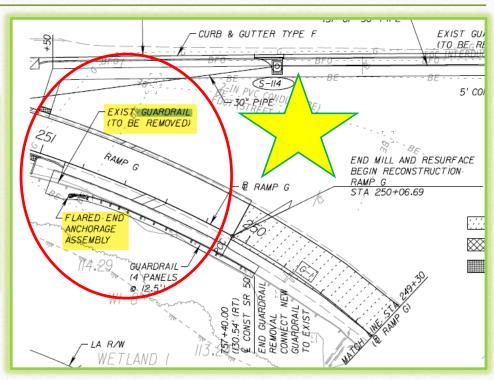
- 1. Pursuant to 35 United States Code, Chapter 18, also known as the Bayh Dole Act of 1980, the non mountable curb was developed through federal funding. The 'Portable Temporary Low Profile Barrier For Roadside Safety' is a licensed design by the University Of Florida. Any infringement on the rights of the designer shall be the sole responsibility of the user.
- 2. This standard drawing (Index No. 412) is provided by the Florida Department Of Transportation solely for use by the Department and its assignees. The purpose for this standard drawing is to indicate the approval of use of the barrier on the State Highway System; to provide sufficient pictorials for identifying the barrier unit; and, to provide general installation geometry for the barrier.
- 3. This legally mandated relationship is unique to federally funded University patents that Department contractors use on Contracts. Pursuant to federal law, the University may pursue royalties for a valid patent. Only those barrier units cast by producers licensed by the University Of Florida will be allowed for installation on the State Highway System in Florida. Barrier wall units shall conform to Section 521 of the Standard Specification and shall be produced in Department-approved plants with quality control plans for precasting concrete barrier walls. Each barrier wall unit shall be permanently marked with an identification that is traceable to the manufacturer, the producing precast concrete plant and the date of production. This permanent identification mark will serve as certification that the unit has been manufactured in accordance with University of Florida drawings and specifications, and the approved quality control program.
- 4. The low profile barrier is to be installed only with hardware and accessories furnished by the licensed barrier producer. Units shall be used for no purpose other than as interconnected segments in a run of barrier. Low profile barrier wall units shall maintain firm contact with adjoining units. Nuts on tensioning rods shall be installed snug tight.

- Plans called for removal of partial run of guardrail and approach terminal without accounting for required ribbon strength.
- Does not meet Standard Plans, Index 536-001



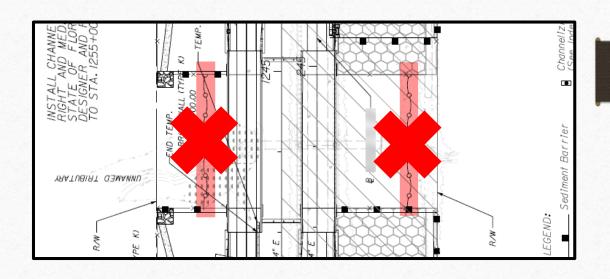
Plan Errors and Omissions – Example 5 Standard Plans, Index 536-001





Plan Errors and Omissions – Example 6 Erosion & Sediment Control Devices

• Floating turbidity barrier shown perpendicular to the flow, which is incorrect



Plan Errors and Omissions – Example 6 Erosion & Sediment Control Devices

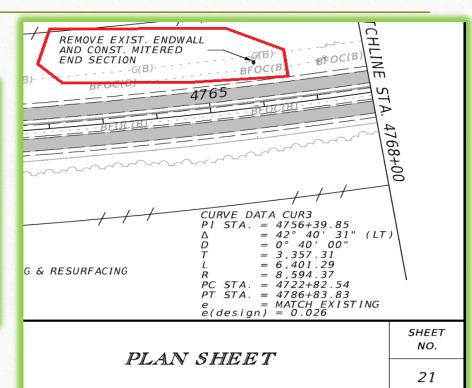




Plan Errors and Omissions – Example 7 Missing Quantities and Pay Items

SUMMARY OF QUANTITIES

	SUMMARY OF MISCELLANEOUS DRAINAGE ITEMS														
PAY ITEM NO.	PAY ITEM DESCRIPTION	LOCATION	SIDE	UNIT	QUAN	TITY	то	ΓAL							
	PAI TIEM DESCRIPTION	STA. TO STA.	SIDE	UNIT											
		31A. 10 31A.			P	F	P	F							
0430 94 1	DESILTING PIPE, 0-24"	1433+75.00	RT	LF	24.0		142								
		1437+50.00	LT/RT		118.0										
0430175124	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 24" S/CD	1437+50.00	LT	LF	6.0		6								
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	1437+50.00	RT	EA	1.0		1								
	Needed 18" MES @ Sta. 4766+00														
								SHEET							



Plan Errors and Omissions

Design Considerations:

- ➤ Verify Design Standard Plans, ADA and MUTCD are being met
- Review plans to make sure items placed in appropriate location
- Verify all Pay Items and Quantities are accounted for

Bid Q & A

- Incorrect Bid Tab Quantities
- Plan Deficiencies

Bid Q & A – Example 1 Plan Deficiency and Bid Tab Quantity

Question ID: 22843

The expedite files, quantity table and plan page all indicate there should be two 70' mast arms and two 78' mast arms. However the data table on sheet T-14 indicates all four mast arms are 78'. Can you please clarify?

Published: 7/16/2018 9:27:45 AM

Answers

B

Note: The District Approved Answer is the most recent answer published by the Department. Previously published answers are either applicable or void (no longer applicable).

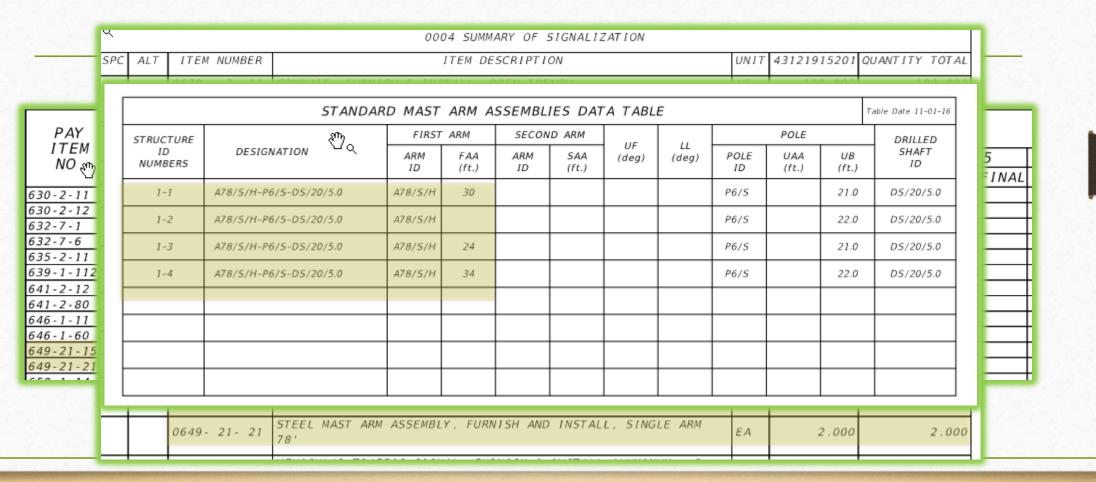
District Approved Answer

All prospective bidders shall prepare their bids based upon the contract plans.



Published: 7/19/2018 4:24:40 PM

Bid Q & A – Example 1 Plan Deficiency and Bid Tab Quantity



Question ID: 23068

Ref sh 11, proposed 18" Pipe crossing and MES @ Sta 357+22 LT. A review of the drainage structures sh 13 appears to indicate a proposed swale off the end of the MES, yet the plan view does not show a proposed swale, nor any limits to said swale. If swale is required, please provide more detail and the station limits expected.

Published: 8/8/2018 11:11:18 AM

Answers

Note: The District Approved Answer is the most recent answer published by the Department. Previously published answers are either applicable or void (no longer applicable).

District Approved Answer

The swale/ditch is to be constructed from S-3 to S-6, and beginning and end stations are noted in the Plan Sheet No. 11. Please refer to the special dich/swale detail in Plan Sheet No. 12.

Published: 8/10/2018 4:26:21 PM

Question ID: 23099

Please read the last question again as the response does not reflect the stationing defined in the question. S5 is the structure involved and does not have any details reflected on sheet 12 (defines the special ditch parallel to US 41) nor anywhere else in the plan set. Please confirm if there is a proposed swale required (as indicated on sh 13) and if so, provide the typical section and limits of said proposed swale.

Published: 8/18/2018 3:07:27 PM

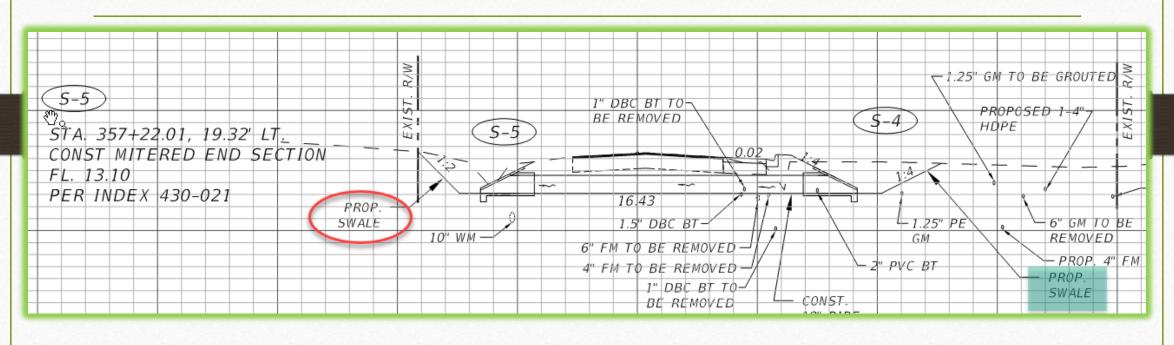
Answers

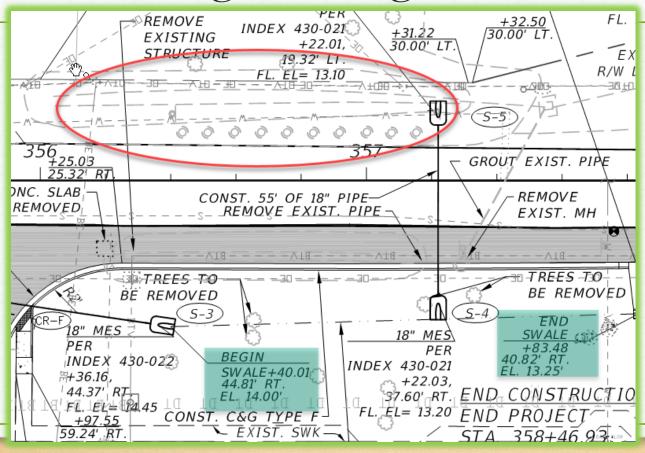
Note: The District Approved Answer is the most recent answer published by the Department. Previously published answers are either applicable or void (no longer applicable).

District Approved Answer

For clarification, the swale is required from Station 357+05 to 357+29 Left. The bottom width of the swale is 1.5 feet. The swale shall have 1:4 front and back slopes and a 1.5-foot bottom width.

Published: 8/23/2018 4:40:04 PM





Bid Q & A – Example 3 Bid Quantities

Proposal Line Number		Item ID Description	Approximate Quantity and Units	Unit Price	Bid Amount
0135	0107 2		13.590		
	MOWING		AC	(\$1,000.00000)	\$13,590.00

Bid Q & A – Example 3 Bid Quantities

									SUMM	ARY OF	LITTE	R REMOV	/AL AI	ND MOV	WING					
				>	\succeq	LITTER REMOVAL							MOW I NG							
	CONST.	LOCATION		10N (S)	EN(0107	1			0107 2							
	PHASE		SIDE	URAT (DAY	REQUENCY (DAYS)	455.4		L W	CYCLES		AREA		4 D E 4				AREA			
۹		STA. TO STA.		7	RE (L	AREA ID	L			,,	TOTAL	(AC)	AREA I D	L	W	CYCLES	AC/	TOTAL (AC)		
1		31A. 10 31A.		7	F					CYCLE	Р	F	10				CYCLE	Р	F	
1	1	5236+32.69 to 5263+71.80	LT	30	30		2739.1	64.3	1	4.043	4.043			2739.1	64.3	1	4.043	4.043		
1	1	5244+43.00 to 5258+00.00	RT	30	30		1357.0	82.0	1	2.554	2.554			1357.0	82.0	1	2.554	2.554		
1	2	5244+75.76 to 5260+95.59	RT	30	30		1619.8	133.8	1	4.975	4.975					1				
1	4	5232+00.00 to 5274+00.00	LT	30	30		4200.0	101.6	1	9.796	9.796			2739.0	64.3	1	4.043	4.043		
П	4	5234+50.00 to 5246+98.89	RT	30	30		1248.9	45.3	1	1.299	1.299			1248.9	12.8	1	0.367	0.367		
1	4	5254+99.64 to 5265+00.00	RT	30	30		1000.4	40.1	1	0.921	0.921			1000.4	11.3	1	0.260	0.260		
1	5	5230+00.00 to 5242+99.41	LT	30	30		1299.4	38.2	1	1.140	1.140					1				
1	5	5259+00.00 to 5274+00.00	LT	30	30		1500.0	37.5	1	1.291	1.291					1	and the second second	illi de mano		
1				30	30				1							1				
I								SUB-TOTAL:	26.020		SUB-TOTAL: 11.267									
						TOTAL: 26.02								TOTAL: 11.27						

Bid Q & A – Example 3 Bid Quantities

	SUMMARY OF LITTER REMOVAL AND MOWING																		
			>	>		LITTER REMOVAL									MOW I	NG			
CONST.	LOCATION		10N (S)	REQUENCY (DAYS)		0107 1							0107 2						
PHAS		SIDE	RAT	DO YA	4054					AREA		4054			CYCLES	AREA			
	STA. TO STA.]	30,	RE(AREA ID	L	W	CYCLES	AC/	TOTAL	(AC)	AREA ID L	L	W		AC/	TOTAL	(AC)	
	374, 10 374.		7	F					CYCLE	Ρ	F					CYCLE	Р	F	
2A	184+00.00 to 188+52.09	LT	30	30		452.1	17.3	1	0.180	0.180			105.3	6.2	1	0.015	0.015		
2B	184+37.01 to 186+23.31	LT	30	30		186.3	42.7	1	0.183	0.183			186.3	14.8	1	0.063	0.063		
2B	184+34.53 to 187+80.00	RT	30	30		345.5	23.5	1	0.186				154.7	3.0		0.011	0.011		
3	279+92.07 to 284+12.78	LT	60	30		420.7	38.1	2	0.368	0.736			205.1	6.5	2	0.031	0.061		
3	280+60.45 to 280+92.67	RT	60	30		32.2	23.4	2	0.017	0.035					2				
4	280+00.58 to 281+67.42	RT/LT	90	30		166.8	12.0	3	0.046	0.138					3				
5	201+04.07 to 204+48.06	LT	75	30		344.0	146.8	3	1.159	2.898					3				
5	201+84.54 to 205+30.76	RT	75	30		346.2	17.3	3	0.137	0.344			111.3	3.4	3	0.009	0.022		
6	281+63.48 to 289+39.57	RT/LT	75	30		776.1	34.8	3	0.620						3				
6	202+04.48 to 205+15.61	RT	75	30		311.1	15.4	3	0.110	0.275			111.3	3.4	3	0.009	0.022		
6	202+22.01 to 216+76.38	LT	75	30		1454.4	62.4	3	2.083	5.209					3				
7	201+04.07 to 204+48.06	LT	45	30		344.0	146.8	2	1.159	1.739			188.0	5.6	2	0.024	0.036		
7	204+15.53 to 216+91.06	RT	45	30		1275.5	61.1	2	1.789	2.684			745.9	24.9	2	0.426	0.640		
8	201+84.54 to 205+30.76	RT	45	30		346.2	17.5	2	0.139	0.209			111.3	3.4	2	0.009	0.013		
8	387+19.69 to 392+70.00	RT	45	30		550.3	29.5	2	0.373	0.559			200.7	6.0	2	0.028	0.041		
9	388+39.87 to 392+51.69	RT	45	30		411.8	48.1	2	0.455						2				
10	200+00.00 to 217+94.39	RT/LT	30	30				1	0.700						1	0.700	0.700		
11	200+00.00 to 217+94.39	RT/LT	30	30				1	0.700	0.700					1	0.700	0.700		
			30	30				1							1				
									SUB-TOTAL:	19.005 SUB-TOTAL: 2.324									
									TOTAL:	19.00						TOTAL:	2.32		

Bid Q & A

Design Considerations:

- If Bid Tabs are missing or have extraneous Pay Items or contain incorrect quantities, correct and issue a revision
- If plan sheets are missing information, correct and issue a plans revision with updated Bid Tabs
- Don't use Q&A as an avenue to avoid addendums

Back Up Documentation

- Summary of Quantity Sheets -Area IDs
- CADD Zip Files
- Commitments

Back Up Documentation - Example 1 Summary of Quantity's - Area IDs

	SUMMARY OF LITTER REMOVAL AND MOWING																		
				2	\succeq		LITTER REMOVAL								MOW I I	VG			
CO	NST .	LOCATION		10N (S)	REQUENC) (DAYS)		•		0107	1						0107	2		
	ASE L		SIDE	RAT	ZY AY	455.4			CYCLES		AREA						AREA		
, , , ,		STA. TO STA.		ZZ (D	RE(AREA I D	L	W		AC/	TOTAL	. (AC)	AREA I D	L	W	CYCLES	AC/	TOTAL	(AC)
		STA. TO STA.		D	FI	10				CYCLE	Р	F	10				CYCLE	Р	F
	1	5236+32.69 to 5263+71.80	LT	30	30		2739.1	64.3	1	4.043	4.043			2739.1	64.3	1	4.043	4.043	
	1	5244+43.00 to 5258+00.00	RT	30	30		1357.0	82.0	1	2.554	2.554			1357.0	82.0	1	2.554	2.554	
	2	5244+75.76 to 5260+95.59	RT	30	30		1619.8	133.8	1	4.975	4.975					1			
	4	5232+00.00 to 5274+00.00	LT	30	30		4200.0	101.6	1	9.796	9.796			2739.0	64.3	1	4.043	4.043	
	4	5234+50.00 to 5246+98.89	RT	30	30		1248.9	45.3	1	1.299	1.299			1248.9	12.8	1	0.367	0.367	
	4	5254+99.64 to 5265+00.00	RT	30	30		1000.4	40.1	1	0.921	0.921			1000.4	11.3	1	0.260	0.260	
	5	5230+00.00 to 5242+99.41	LT	30	30		1299.4	38.2	1	1.140	1.140					1			
	5	5259+00.00 to 5274+00.00	LT	30	30		1500.0	37.5	1	1.291	1.291					1			
				30	30				1							1			
			26.020		SUB-TOTAL: 11.267														
									·	TOTAL:	26.02					·	TOTAL:	11.27	

Back Up Documentation CADD Zip Files

- Verify that the CADD.zip files are being delivered
- Files are necessary for the Construction Final Estimates verification of subsurface soil excavation quantities
 - Multiline no longer supported, now using Trimble Business Center HCE
- Include all backup calculations

Back Up Documentation Commitments

- Provide details on the "Commitments Form" on how a commitment was addressed through the Design Process
 - Clearly inform construction of how a commitment was incorporated into the design
 - Helps construction when CSIs and ATCs are proposed

Back Up Documentation

Design Considerations:

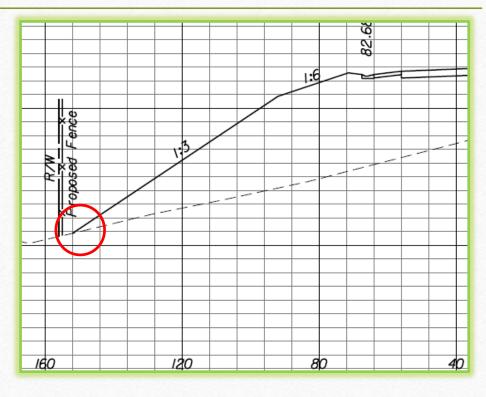
- Confirm CADD Zip Files include:
 - All Shape Files with Area Identifications
 - Include all backup calculations and documentation related to design
- Provide Detailed records of commitments

Constructability Issues

- Erosion and Sediment Control
- Temporary Traffic Diversions
- Asphalt Paving

Constructability Issues – Example 1 Erosion & Sediment Control on Embankments



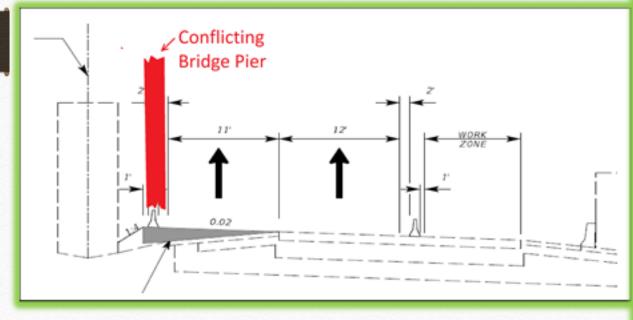


Constructability Issues – Example 1 Erosion & Sediment Control on Embankments

E&S Control Embankment Design Considerations:

• Step the embankment slopes to avoid ending toe of slope next to wetland or R/W line

Constructability Issues – Example 2 Temporary Traffic Diversion





Constructability Issues – Example 2 Temporary Traffic Diversion

Temporary Traffic Diversion Design Considerations:

• Consider any potential conflicts when incorporating temporary traffic diversions

Asphalt Pavement

- Consider Milling & Paving Equipment Dimensions
- Minimize Milling Depth & Paving Thickness Changes
- Correct Cross Slope with Milling
- Require Manhole Adjustments
- Keep FC-5 out of Medians, Turn Lanes, Urban Areas
- Maximize Lane Closure Times

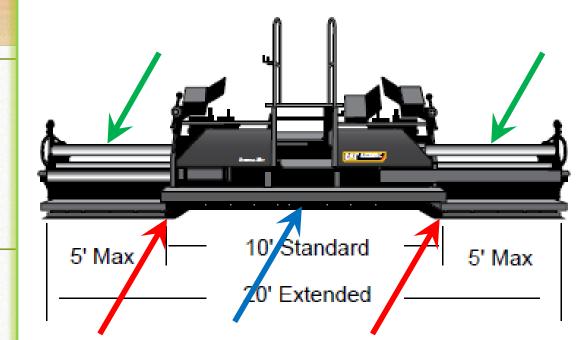
Paving Equipment Dimensions

10ft Main Screed (blue arrow)

Up to 5 ft Extensions (green arrows)

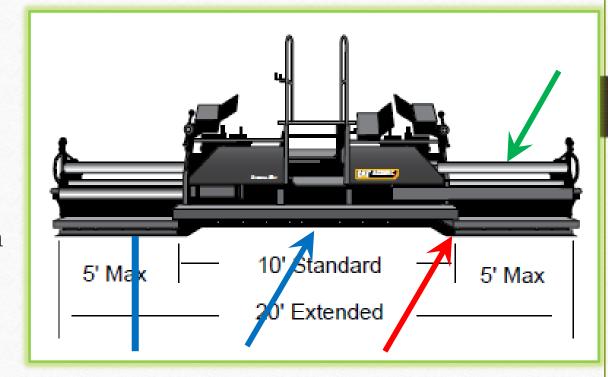
Paving Width 20ft or Less Doesn't Mean It's Constructable

Slope Changes Can Only Occur at Certain Points (red arrows)



Example 3: Paving Equipment Dimensions

- To pave 12' lane:
- 10' main screed (blue arrow)
- + 2' extension (blue line) at same slope
 - Max. 5' paved with extension (green arrow)
 - at different slope (pivot point (at red arrow)



Paving Equipment: Shoulder Width Design Considerations

- 5ft or less
 - ➤ Pave Shoulder AND Travel Lane in Single Pass
 - ➤ 10ft Screed + 2ft Extension = 12ft Lane, Pave 5ft Shoulder with Other Extension
- 8ft or more (10ft or more is optimal)
 - Pave Travel Lane in First Pass, Pave Shoulder in Second Pass
- >5ft to <8ft (Worst Case)
 - Requires More Specialized (Less Common) Equipment
 - Saves Tonnage, but Results in Higher Price per Ton
 - Can Pay More For 6ft Shoulder than 8ft

Milling Machine Details: Design Considerations

- Standard Drum Width 7-8ft
- Standard Drum Width Allows Milling Standard Lane in Two passes
 - Follow One Lane Line on First Pass & Other Lane line on Second Pass
- 12ft Drums Available
 - But Machine is Wider than Lane = Increases Transport Cost
- 12ft drum means left edge follows right edge, not always ideal
- Machine is 30-40ft long and driver is on top about 10ft above road surface
- Operator behind machine sets 2 controls to depth (or 1 to depth & 1 to slope)

Milling Machine Details: Minimize Milling Depth & Paving Thickness Changes





Example 4: Minimize Milling Depth & Paving Thickness Changes

- Structural Course thickness reduced by 0.5" in overbuild areas
- Taper structural course from 1.5" > 2" > 1.5"
- 15 paving thickness changes (not good)

LIMITS OF MILLING AND RESURFACING WITHOUT OVERBUILD (SEE PAVEMENT DESIGN BELOW)

STA. 575+90.00 TO STA. 600+10.00 STA. 613+00.00 TO STA. 628+10.00 STA. 640+00.00 TO STA. 674+50.00 STA. 698+95.00 TO STA. 702+20.00 STA. 722+00.00 TO STA. 724+85.00 STA. 737+50.00 TO STA. 740+80.00 STA. 752+00.00 TO STA. 780+60.00 STA. 786+20.00 TO STA. 789+80.00

MAINLINE, TURN LANES, & MEDIAN CROSSOVERS MILLING

MILL EXISTING ASPHALT PAVEMENT (3.25" AVG. DEPTH)

MAINLINE, TURN LANES, & MEDIAN CROSSOVERS RESURFACING

ASPHALT RUBBER MEMBRANE INTERLAYER (0.5")

TYPE SP STRUCTURAL COURSE (TRAFFIC DI(2.0") PG 76-22)

AND FRICTION COURSE FC-5 (0.75") (PG 76-22)

LIMITS OF MILLING AND RESURFACING WITH OVERBUILD (SEE PAVEMENT DESIGN BELOW)

STA. 600+10.00 TO STA. 613+00.00 STA. 628+10.00 TO STA. 640+00.00 STA. 674+50.00 TO STA. 698+95.00 STA. 702+20.00 TO STA. 722+00.00 STA. 724+85.00 TO STA. 737+50.00 STA. 740+80.00 TO STA. 752+00.00 STA. 780+60.00 TO STA. 786+20.00

MAINLINE, TURN LANES, & MEDIAN CROSSOVERS MILLING

MILL EXISTING ASPHALT PAVEMENT (3.25" AVG. DEPTH)

MAINLINE, TURN LANES, & MEDIAN CROSSOVERS RESURFACING

ASPHALT RUBBER MEMBRANE INTERLAYER (0.5°)

TYPE SP STRUCTURAL COURSE (TRI<mark>AFFIC DIVI.5°) IPG</mark> 76-22)

AND FRICTION COURSE FC-5 (0.75°) IPG 76-22)

MAINLINE, TURN LANES, & MEDIAN CROSSOVERS OVERBUILD

TYPE SP OVERBUILD (TRAFFIC D) THICKNESS VARIES (0,5" TO 4,0") (PG 76-22)

Milling Depth & Paving Thickness

Design Considerations:

- Varying Milling Depths & Paving Thicknesses
 - Not Recommended for Traditional Milling & Paving Projects
 - More Difficult to Construct
 - Decreases Production Rates & Increases Costs
 - Increases Chances for Mistakes (i.e. Construction \neq Design)

Structural Course & Overbuild

Design Considerations:

- Keep Structural Course Thickness Consistent
 - > If Cross Slope Corrections Can Be Achieved with Milling
 - Paving is All Constant Thickness
 - Constant Thickness Paving
 - More Consistent, Better Quality Pavement
 - Contractor Can Be Held to Density Requirements for Constant Thickness Paving

Correct Cross Slope with Milling

- Results in Constant Thickness Paving
 - More Consistent, Higher Quality, Smoother Pavement
 - Density Testing is Required
 - Variable Thickness Overbuild is Exempt

Provide Design Slopes aka No "Match Existing"

- Specific Design Slopes Provide Defined Construction Requirements
- Can Hold Contractor to Specification's Cross Slope Tolerances
- When Paving, Contractor Can Maintain 2 of the 3 controls
 - Smoothness, Thickness, & Cross Slope
- Slopes are More Work to Design, but Pavement Construction Quality is Better

330-9.4.5.2 Straightedge Exceptions: Straightedge testing will not be required in the following areas: shoulders, intersections, tapers, crossovers, sidewalks, shared use paths, parking lots and similar areas, or in the following areas when they are less than 250 feet in length: turn lanes, acceleration/deceleration lanes and side streets. The limits of the intersection will be from stop bar to stop bar for both the mainline and side streets.

As an exception, in the event the Engineer identifies an objectionable surface irregularity in the above areas, straightedge and address all deficiencies in excess of 3/8 inch in accordance with 330-9.5.

The Engineer may waive straightedge requirements for transverse joints at the beginning and end of the project, at the beginning and end of bridge structures, at manholes, and at utility structures if the deficiencies are caused by factors beyond the control of the Contractor, as determined by the Engineer. In addition, the Engineer may also waive the straightedging requirements on ramps and superelevated sections where the geometrical orientation of the pavement results in an inaccurate measurement with the rolling straightedge.

Keep FC-5 out of Median Cross Overs, Turn Lanes, and Urban Curb & Gutter Sections

- FC-5 is Open-Graded:
 - Lacks Aggregate Interlock of Dense-Graded Asphalt
 - Susceptible to Raveling from Turning Movements
 - Warranty Spec Exemption for Raveling in Cross Overs & Turn Lanes
 - FPDM says don't place FC-5 in such locations
 - Warranty Enforcement Challenging or Impossible

Maximize Lane Closure Time

Design Considerations

- Widen Work Windows, When Safety Allows
- Every 15 minutes/day = 1.0 to 1.5 hours/week
- Longer Working Time
 - More Tons Per Day, Fewer Stops & Starts, Fewer Joints
 - Higher Quality, Smoother Pavement, Constructed Faster

Questions?

State Construction Office Staff Directory

http://www.fdot.gov/construction/contact/SCOContact.shtm